



Phytoremediation of Domestic Wastewater

Abhijit D. Garad

Abstract: Phytoremediation is fresh, well organized, low priced and recycled method for control of environmental pollution. In this phytoremediation technology, plants are used to enhance the status of environment. By using this method, organic and inorganic pollutant can easily eliminate from domestic. An aquatic plant culture was grown in regimented cement tank. Domestic waste Water was filled in this cement tank for specified interval of seven days. Before growth of aquatic plant culture quality of domestic waste water was evaluated. After specified time interval domestic waste water quality was again evaluated to check improvement of quality of waste water. The result of analysis indicates that phytoremediation process improves the quantity of waste water. For this phytoremediation process Canna, Hyacinth colocasia Arabica, Typha etc. aquatic plants are used. These aquatic plants absorb organic and inorganic parameters from waste water.

Keywords: Low-Cost Treatment, Waste Water Pollution, Phytoremediation, Domestic Waste Water.

I. INTRODUCTION

Generally, Plants are known as mainly source of food, fuel and fiber. But some aquatic plants are very useful for removal pollutants from waste water. In recent years, the man-made chemicals contain toxic pollutants which increase in ecosystems significantly. Toxic pollutants such as Pesticides, solvents, dyes etc. mixed in water sources and make it harmful for environment. To remove such harmful pollutants aquatic plants are very helpful. For removal of such toxic pollutants from water Typha, Hyacinth, Colocasia Arabica, Canna etc. aquatic plants are used. These aquatic plants absorb organic and inorganic pollutants for their survival. This technic is known as phytoremediation [4].

Phytoremediation is a developing technology to remove harmful or toxic pollutants by using green plants.

The key factor of this process is low cost and aesthetic aspects. For aesthetic view make it suitable to reform large contaminated sites in populated area. Phytoremediation is eco-friendly technic for remediation of waste water and soil by using plants [2]. Phytoremediation process is worked with the help of root microorganism and plants. They decompose the toxic compound to non-toxic compound. Toxic

compound such as organic compound, pesticides, heavy metals etc. are effectively remediate by aquatic plants. In this process various activities disclose like degradation, dehalogenation, de nitrification etc. During these activities breakdown of complex compound takes place. This complex compound further converted in to simple and non-toxic compound. Green plants and algae have capability to remove heavy metals by action of metallothioneins [5].

Following are some advantages of phytoremediation technic-

- Low cost treatment process
- Very simple and easy to handle
- High likelihood of public acceptance
- Gives aesthetic view
- Ability to remove heavy metals and radio nuclides

II. MATERIALS AND METHODS

The process of phytoremediation of domestic waste water was carried by using aquatic plants like Hyacinth, Canna, Colocasia Arabica, and Typha etc. [4]

A. Canna

- Kingdom (Plantae)
- Order (Zingiberales)
- Family (Cannaceae)
- Genus (Canna)



B. Colocasia Arabica

- Kingdom(Plantae)
- Order (Arales)
- Family (Araceae-Arum)
- Genus(Colocasia Schott.-Colocasia)



C. Typha

- Kingdom (Plantae)
- Order (Poales)
- Family (Typhaceae)



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* Correspondence Author

Abhijit D. Garad*, Department of Civil Engineering, Shri Jagdishprasad Jhabarmal Tibrewala University, Jaipur (Rajasthan), India. E-mail: abhijitgarad1988@gmail.com

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D. Hyacinth

<ul style="list-style-type: none"> • Kingdom(Plantae) • Order (comeliness) • Family (Pontederiaceae) 	
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For this project work the batch process is used for treatment of domestic wastewater by water hyacinth, Canna, Colocasia Arabica, Typha plants. The major objective of this project is to develop a low cost treatment plant for domestic wastewater treatment by using Phytoremediation process [7].

In this project we study the treatment response of water hyacinth, Canna, Colocasia Arabica, Typha plants to domestic wastewater. Water hyacinth plant required for this project were collected from Ujani Dam, Bhigwan and cultured in tank. For full development of plants, it takes 15 days. After full development these plants were used for project work while domestic wastewater sample was collected manually from the Drainage of Engineering College Hostels.

Three experimental trails for the treatment of domestic wastewater by water hyacinth, Canna, Colocasia Arabica, Typha plants were carried out in laboratory. The experiment set-up or treatment system consisting of Ponds. These ponds were arranged in groups of three without any connection between each other. For each trail, these ponds were filled manually with domestic wastewater. First of all the sample was tested for initial parameters such as pH, Turbidity, Chloride, Hardness, B.O.D., COD. Etc. then fresh, wet Water Hyacinth, Canna, Colocasia Arabica, Typha plants were stocked or planted in one pond for detention period of 7 days. Every 7 day we had taken 500 ml of sample Untreated and Treated from each pond and testing for the parameters such as pH, Turbidity, Chloride, Hardness, B.O.D., COD., Calcium, Magnesium, Iron, Sulphate, Phosphate, Manganese etc.

Parameter of Treatment Plant

1) Root zone treatment Plant	2) Pond
Length= 3m	Length= 1m
Width = 2m	Width = 0.3m
Depth = 0.5m	Depth = 0.3m
Area= 6m ²	Area= 0.3m ²
Volume =3.0 m ³	Volume =0.09 m ³

All the parameters pH Turbidity, Chloride, Hardness, BOD, COD, is analyzed as per the standard procedure water & waste water analysis.

III. RESULT AND DISCUSSION

Treatment given to domestic waste water by Water Hyacinth, Canna, Colocasia Arabica, Typha etc. plants was carried for studying the various parameters of waste water samples. Next table shows the result different water parameter before and after phytoremediation process.

Parameter	April		May		June	
PH	6.5	7.5	7.2	7.5	7.6	7.9
Turbidity	127	115	98	76	43	16
Temperature	27	28	27.8	28	26	28
Chloride	30	26	24	20	18	12
TDS	92.8	85.2	119.2	124	86.4	75
Dissolved Oxygen	3.2	6.3	7.11	8.13	11.06	11.17
COD	224	190	164	137	102	76
Total Hardness	74	88	108	80	70	38
Calcium	24	32	29.6	20.8	16.8	12.4
Magnesium	11.6	8.26	6.91	6.8	3.4	1
Nitrates	15.5	9.3	6.2	4.4	3.9	1.2
BOD	140	129	95	74	41	29
Iron	2.09	1.9	1.09	0.8	0.4	0.16
Sulphate	12.2	10.3	2.1	1.9	1	0.9
Phosphate	0.6	0.07	0.04	0.03	0.026	0.01
Manganese	0.02	0.01	0.01	Nil	0.01	Nil
No. of Coliform	11	11	11	11	11	11

Above table shows that Phytoremediation is a developing treatment technology for remediation of domestic waste water or contaminated water.

IV. CONCLUSION

Based on the results from the experimental study Water Hyacinth, Canna, Colocasia Arabica, Typha etc. plants are efficient in removing the BOD, COD and Turbidity etc. from domestic waste water. But on the contrary Chloride, Sulphates, Hardness are increased, but this is within permissible limit which functions as nutrients for plants. From treated effluent quality, the effluent could discharge to the environment without adverse effect on environmental quality and health.

The finding of this study revealed that treatment of domestic wastewater by using water hyacinth, Canna, Colocasia Arabica, Typha etc. plants does not involve any elaborate mechanism. It is low cost treatment; hence it is effective and recommended for use especially in rural areas where land area is available cheaply.

The concentrations of pollutants in effluent are within permissible limits for land discharge. Treated effluent is used for irrigation purpose. It is not only to control the pollutants for discharging the effluent but simultaneously give the valuable by products from the treatment system and it does not require any maintenance.

From this, we concluded that, Phytoremediation is developing natural cleanup process with very low cost. Generally this technic is suitable is waste water is contaminated at low level. This technic is effective if waste water contains less toxic pollutants. Phytoremediation process gives treatment for all residual waste water and helps to recycle and reuse for various activities.

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AUTHORS PROFILE



Abhijit D Garad is research student of PhD in Civil Engineering Department, Shri Jagdishprasad Jhabarmal Tibrewala, University (JJTU), Jaipur, India. His research interest is in Waste water management, water resources, Lechate control techniques, recycling of plastic and innovative trends in solid waste management. He obtained bachelor degree in civil engineering from Pune University. He also received master's degree in Environment engineering from Pune University. He is assistant professor in Dhole Patil College of Engineering, Pune, India (Grade A).